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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/564,314

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EXAMINER

HAN, KWANG S

ART UNIT

PAPER NUMBER

1727

NOTIFICATION DATE

DELIVERY MODE

11/14/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/564,314	USUI ET AL.	
	Examiner	Art Unit	
	Kwang Han	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1,3,4,6,7,9,10,33 and 35-43 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1,3,4,6,7,9,10,33 and 35-43 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/7/11</u> . | 6) <input type="checkbox"/> Other: ____. |

ELECTROLYTE COMPOSITON, PHOTOELECTRIC CONVERTER AND DYE-SENSITIZED SOLAR CELL USING SAME

Examiner: K. Han SN: 10/564,314 Art Unit: 1727 November 8, 2011

Detailed Action

1. The Applicant's request for reconsideration filed on August 29, 2011 was received.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. Claims 1, 6, 9, 10, 33, and 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono (JP 2003-157914, machine translation) in view of Wang et al. (J. Am. Chem. Soc. 2003, 125, 1166-1167) is maintained.

Regarding claim 1, Ono is directed towards a photoelectric conversion element comprising an electrolyte composition comprising an ionic liquid (liquefied salt, electrolyte) [0024, 0025] and conductive particles containing carbon as a main component [0050, Abstract] with an electrolyte composition in the form of a gel [0051] but is silent towards forming a gel by the action of the conductive particles.

Wang teaches that photovoltaic devices with submicron sized particles including graphite particles dispersed in a high ionic strength media, form stable colloidal solutions and nanoparticles have shown to be effective as a "gelator" to solidify ionic liquids (Pg 1166, Col. 1 - Page1167, Col. 2). It would have been obvious and well within the skill of one of ordinary skill in the art to provide the conductive particles of

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Ono within a nanoparticle range since Wang recognizes nanoparticle can act as a gelator within an ionic liquid. Furthermore, the rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art (MPEP 2143).

Regarding claims 6 and 33, Ono discloses the conductive particle to be comprised of carbon including carbon fiber and carbon black [0050].

Regarding claims 9 and 10, Ono discloses the electrolyte to be used in an photoelectric conversion element with a semiconductor fine particle containing layer (20) which is dye sensitized, a counter electrode, and a transport layer comprised of the electrolyte (electrolyte layer) [Abstract, 0022] and conductive particles containing carbon as a main component [0050, Abstract] with an electrolyte composition in the form of a gel [0051] but is silent towards forming a gel by the action of the conductive particles.

Wang teaches that photovoltaic devices with submicron sized particles including graphite particles dispersed in a high ionic strength media, form stable colloidal solutions and nanoparticles have shown to be effective as a "gelator" to solidify ionic liquids (Pg 1166, Col. 1 - Page1167, Col. 2). It would have been obvious and well within the skill of one of ordinary skill in the art to provide the conductive particles of Ono within a nanoparticle range since Wang recognizes nanoparticles can act as a gelator within an ionic liquid.

Regarding claim 35, Ono discloses the ionic liquid to be a molten salt being liquid at room temperature [0025].

Regarding claim 36, Ono discloses the fused salt to be a compound expressed by Formulas Y-a through Y-c showing quaternized nitrogen atom and an imidazole ring [0026-0031].

Regarding claim 37, Ono discloses a molten salt comprising anions selected from bis(trifluoromethylsulfonyl)imide and iodide ions [0035].

Regarding claim 38, Ono is silent towards the conductive particles having a specific resistance values but would inherently have these properties. The courts have held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112 and 2112.01. When the Examiner has provided a sound bases for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Regarding claim 39, Ono discloses a redox couple [0024].

4. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono and Wang as applied to claim 1 above and further in view of Ono is maintained.

Regarding claims 3 and 4, Ono discloses preferred ranges of the conductive particles to be in the range of 80 mass % to 2 mass % depending on the requirements of the counter electrode to supply the electrolyte. It would have been obvious to one of

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ordinary skill in the art at the time of the invention to vary the content of the conductive particles since it has been held that discovering the optimum ranges for a result effective variable such as the conductive particle content involves only routine skill in the art in the absence of showing of criticality in the claimed range (MPEP 2144.05) In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

5. Claims 7 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono and Wang as applied to claim 6 above, and further in view of Smalley et al. (US 7074310) is maintained.

The teachings of Ono and Wang as discussed above are herein incorporated.

Regarding claims 7 and 42, Ono teaches carbon based conductive material for a photoelectric conversion element [Abstract] but is silent towards the use of carbon nanotubes as a conductive material.

Smalley teaches single-wall carbon nanotubes can serve as elements of electronic devices such as photoelectric cell electrodes and active elements (16:2-14) with a diameter range of 0.5nm to about 3.5nm (4:4-6) and length of 80 to 200nm (26:35-38). It would have been obvious to one of ordinary skill in the art at the time of the invention to produce a photoelectric element using single-wall carbon nanotubes as the conductive material because Smalley teaches availability of macroscopic amounts of this material allows for the production of electronic devices such as photoelectric cells (15:46-16:2). It has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re

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Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05).

6. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono and Wang as applied to claim 6 above, and further in view of Tanaka et al. (US 2003/0179537) is maintained.

The teachings of Ono and Wang as discussed above are herein incorporated.

Regarding claims 40 and 41, Ono and Wang are silent towards the size of the carbon fibers or carbon black.

Tanaka teaches a method for producing carbon materials such as carbon fibers and pulp where the diameters are between 2 to 500nm and with an aspect ratio of 10 to 15000 [0024-0026]. It would have been obvious to one of ordinary skill in the art at the time of the invention to carbon particles in the nanoparticle range because Tanaka teaches a method to produce them.

7. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ono, Wang, and Smalley et al. as applied to claim 7 above, and further in view of Smalley et al. (US 2002/0085968, hereinafter referred to as Smalley '968) is maintained.

The teachings of Ono, Wang, and Smalley as discussed above are herein incorporated.

Regarding claim 43, Ono, Wang, and Smalley are silent towards the use of multi-walled nanotubes.

Smalley '968 teaches that carbon nanotubes that are formed may also be multi-walled nanotubes [0068] for a photoelectric element [0207-0208] having a diameter of 3nm to 100nm and lengths from 50nm to 5cm or greater [0064]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use multi-walled nanotubes for a photoelectric element because Smalley teaches when nanotubes are formed they include both single-wall and multi-walled nanotubes which can be used for a photoelectric element. It has been held that where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (MPEP 2144.05).

Response to Arguments

8. Applicant's arguments filed August 29, 2011 have been fully considered but they are not persuasive.

Applicant's principal arguments are:

(a) the Wang reference and the cited reference 11 fail to teach that the submicron sized particles including graphite particles can act as a gelator, and

(b) the definition of the term "nanoparticles" in Wang differ from the definition of the term "submicrometer-sized" in Reference 11.

In response to Applicant's arguments, please consider the following comments:

(a) the Wang reference discloses the exploration and verification of the use of nanoparticles to act as "gelators" to solidify ionic liquid based electrolytes. The cited

Reference 11 (hereinafter referred to as Kosmulski) within Wang teaches the adsorbents (used in the form of fine powders) of anatase and graphite formed stable dispersions in ionic liquids (Page 104, 2:1-2) including the dispersions of graphite alone in basic melt remaining uniformly dispersed over many weeks recognizing that fine powders form the stable dispersions (Page 104, 2:1, bottom). Wang recognizing the teachings of Kosmulski further investigates and verifies the use of nanoparticles to act as "gelators" which would suggest to one of ordinary skill in the art that the particle constituents of the electrolyte in that size range would effectively act as a gelator as taught by Wang, and

(b) as discussed above, the Wang reference was further investigating the teachings of Kosmulski to extend to nanoparticles. The nanoparticles further investigated teaches the ability of these particles to act as a "gelator".

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
Examiner, Art Unit 1727

/Barbara L. Gilliam/
Supervisory Patent Examiner, Art Unit 1727